भारतीय मानक
Indian Standard

IS 4832 (Part 2) : 2023

रासायनिक प्रतिरोधी मोर्टार — विशिष्टि

भाग 2 रेसिन प्रकार

(पहला पुनरीक्षण)

Chemical Resistant Mortars — Specification

Part 2 Resin Type

(First Revision)

ICS 91.100.10

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Flooring, Wall Finishing and Roofing Sectional Committee, CED 05

FOREWORD

This Indian Standard (Part 2) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Flooring, Wall Finishing and Roofing Sectional Committee had been approved by the Civil Engineering Division Council.

The resin type chemical resistant mortars have fairly good resistance to non-oxidizing mineral acids and poor resistance to oxidizing mineral acids. They are fairly resistant to inorganic alkalies. As the resin type of mortars are resistant to water, the joints between bricks or tiles are impermeable when bonded with these mortars. These types of mortars are used for jointing acid-proof bricks or tiles in pickling tanks, storage tanks and as jointing material in floors.

The standard was first published in 1969. In this revision, following major changes have been incorporated:

a) Two new type of resins have been added - cashew nut shell liquid (CNSL) resin and vinyl-ester resin;
b) The physical requirements of these two resins also have been specified like other resins already included in the standard;
c) Safety precaution clause has been added;
d) Sampling plan has been updated;
e) Requirements have been updated in SI units;
f) Packing and marking clause has been updated;
g) BIS certification marking clause has been modified; and
h) Amendment has been incorporated.

This standard is one of the series of standards on the use of chemical resistant mortars; the others being:

Part 1 Silicate type
Part 3 Sulphur type

The composition of the Committee responsible for the formulation of this standard is given in Annex B.

This standard contributes to the United Nations Sustainable Development Goal 9 ‘Industry, innovation and infrastructure, build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation’.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

CHEMICAL RESISANT MORTARS — SPECIFICATION

PART 2 RESIN TYPE

(First Revision)

1 SCOPE

This standard specifies the requirements for resin type chemical resistant mortars for bonding chemical resistant masonry units.

2 REFERENCES

The standards given below contains provisions, which through reference in this text, constitute the provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards:

IS No.	*Title*
IS 4443 : 1980	Code of practice for use of resin type chemical resistant mortars (*first revision*)
IS 4456 (Part 1) : 1967	Methods of test for chemical resistant mortars: Part 1 Silicate type and resin type

3 TERMINOLOGY

For the purpose of this standard, the following definition shall apply.

3.1 Resin Type Chemical-Resistant Mortar — An intimate mixture of liquid resinous material and a powder composed of properly selected filler materials and usually containing the setting agent. These components are mixed at ordinary temperatures to form a trowelable mortar that subsequently hardens.

4 MATERIALS

4.1 Resins

The liquid resin may be either of any or a combination of the following types:

a) Phenolic resin,
b) Furan resin,
c) Epoxy resin,
d) Polyester resin,
e) Cashew nut shell liquid (CNSL) resin, and
f) Vinyl ester resin.

4.2 Fillers

Siliceous and other types of inert fillers may be used but carbonaceous fillers shall be used where resistance to hydro-fluoric acid is required. In general, the filler material shall be selected to have resistance to the particular chemicals to which they will be exposed.

4.3 Catalyst Material

The catalyst material may be incorporated in the fillers in such a manner that it becomes effective when mixed with the resin. However, it may also be supplied separately to be added to the resin or filer materials prior to use in accordance with the manufacturer's recommendation.

4.4 Another type of material like curing agent/hardener may also be supplied which is applicable for epoxy, phenolic resin, etc.

NOTE — The resin, filler, accelerator and catalyst may be supplied in separate packs. For phenolic and furan resin mortars the resin and filler maybe sent in two packs. For epoxy resin mortar the components may be sent, in 3 packs and for polyester resin mortar they may be sent in 3 or 4 packs.

5 PHYSICAL REQUIREMENTS

The resin mortars prepared from the materials given in **3** shall satisfy the requirements given in Table 1 when tested in accordance with IS 4456 (Part 1).

6 GENERAL REQUIREMENTS

The resin shall have a viscosity that will permit it to be readily mixed with the powder by manual methods. The filler materials shall have properly graded particles that will permit the preparation of a minimum joint thickness of 1.5 mm.

7 CHEMICAL RESISTANCE REQUIREMENT

The limits of chemical resistance may be mutually agreed to between the purchaser and the supplier when tested in accordance with IS 4456 (Part 1). A general guide for chemical resistance of resin type mortars to various substances is given in Table 1 of IS 4443.

Table 1 Physical Requirements of Resin Type Chemical Resistant Mortars

(*Clauses* 5, A-3.1 *and* A-3.3)

Sl No.	Characteristics	Requirements for Type of Mortar					
		Phenolic	Furan	CNSL	Polyester	Epoxy	Vinyl-ester
(1)	(2)	(3)	(4)	(5)	(6)	(5)	(8)
i)	Working time, minutes, *Min*, (at 27 °C ± 2 °C)	20	20	20	20	20	20
ii)	Flexural strength, MPa, *Min*, (at 7 days)	7.5	7.5	2	15	15	15
iii)	Compressive strength, MPa, *Min*, (at 7 days)	35	35	10	50	50	50
iv)	Bond strength, *Min*, MPa (*see* Note)	1	1	1.5	1.2	1.2	1.2
v)	Absorption, *Max*, percent by weight	1.0	1.0	1.0	1.0	1.0	1.0

NOTE — In the test for bond strength, the joint shall not fail at or below the value specified.

8 SHELF-LIFE

8.1 The shelf-life from date of manufacture of the resins is fairly limited, especially those of phenolic and polyester types. At the normal temperature of 27 °C ± 2 °C, generally the shelf-life for the phenolic and polyester resins is about 3 months, for CNSL and vinyl-ester is about 6 months and for furan and epoxy resins is about 12 months. However, the shelf-life may vary with storage conditions.

8.2 The shelf-life for the dry-mix depends on the stability of the setting agent incorporated in it. The manufacturer should indicate clearly the maximum shelf-life for both the dry-mix and resin.

9 SAFETY PRECAUTION

9.1 Mixing and applications of the product present a number of hazards. Polyester, epoxy and vinyl-ester resin are flammable, so always follow strict safety while using these mortar. Store mortar away from direct heat, sunlight. In case phenolic, furan and CNSL, protect nose from the fumes and their fumes are carcinogenic.

9.2 Ventilation shall provide thorough air circulation during and after application until the material has cured when used in enclosed areas.

10 SAMPLING

The method of drawing representative samples of the material and the criteria for conformity shall be as given in Annex A.

11 PACKING AND MARKING

The resin shall be packed in suitable sealed airtight containers. The filler shall be properly packed to prevent deterioration in transit and storage. The following information shall be marked legibly and indelibly on each package:

a) Name of manufacturer;
b) Date of manufacture/batch no;
c) Net volume/weight in case of solution;
d) Net weight in case of dry mix;
e) Storage instructions;
f) Shelf life; and
g) Safety precaution instructions.

12 BIS CERTIFICATION MARKING

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

ANNEX A

(*Clause* 10)

SAMPLING PROCEDURE FOR ACCEPTANCE TEST

A-1 LOT

A-1.1 The quantity of resin, filler, catalyst material and hardener/curing agent (if applicable) from the same manufacturing unit offered for inspection in one lot shall be such as to give not less than 500 kg of the mortar when mixed well by suitable means.

A-1.2 Samples shall be selected and tested from each lot separately for ascertaining its conformity to the requirements of the specification.

A-2 SELECTION

Since the mortar is obtained by intimately mixing the resin, filler and catalyst (in case of epoxy, hardener/curing agent) material which are packed separately, as a first step suitable number of containers of resin, filler, catalyst material and hardener/curing agent shall be selected from the lot. The number of containers shall not be less than 10 percent of the total number of containers in the lot. Equal quantities of material shall be taken from each container selected and the resin, filler and catalyst material shall be mixed well to give the sample of mortar for the lot.

A-3 CRITERIA FQR CONFORMITY

A-3.1 Specimens shall be taken from the mortar sample and tested for all the requirements given in Table 1 of this standard.

A-3.2 A lot shall be considered as having satisfied the requirements of this specification if the results for all the tests satisfy the relevant requirements of this specification.

A-3.3 Re-test

If the sample when tested, do not comply with the requirements specified in Table 1, another set of sample shall be prepared from the same lot and subjected to the tests. If the second sample also fails to comply with the requirements of Table 1, then the lot represented by the samples shall be rejected.

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Flooring, Wall Finishing and Roofing Sectional Committee, CED 05

Organization	*Representative(s)*
In Personal Capacity (*L/109, Sarita Vihar, New Delhi - 110076*)	Shri Ashok Khurana (***Chairperson***)
Acropolis Institute of Technology and Research, Indore	Dr Satish Kumar Sharma Shri Jayant Awasthy (*Alternate* I) Shrimati Deepshikha Shukla (*Alternate* II)
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Ardex Endura India Pvt Ltd, Bengaluru	Shri K. P. Paulson Shri Gopinath Krishnan (*Alternate*)
Central Public Works Department, New Delhi	Shri A. K. Sharma Ms Nandini Mukhopadhyay (*Alternate*)
Choksi Laboratories Limited, Indore	Shri Vyangesh Choksi
Construction Industry Development Council, New Delhi	Shri P. R. Swarup Shri Ravi Jain (*Alternate*)
CSIR - Central Building Research Institute, Roorkee	Shri S. K. Singh Dr Achal Kumar Mittal (*Alternate*)
CSIR - Central Glass and Ceramic Research Institute, Kolkata	Dr Parag Mangalbhai Solanki Dr Parvesh Agarwal (*Alternate* I) Dr Asha T. Anil (*Alternate* II)
CSIR - Central Road Research Institute, New Delhi	Dr Rakesh Kumar
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Engineers India Limited, New Delhi	Shri Samir Das Shri Akhilesh Maurya (*Alternate* I) Shri Anish Mahala (*Alternate* II)
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Indian Institute of Technology, Gandhinagar	Dr Gaurav Srivastava
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MYK Laticrete India, Hyderabad	Dr P. Arjunan Shri N. Radhakanth (*Alternate*)

Organization	*Representative(s)*
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National Test House, Kolkata	Shri D. V. S. Prasad Dr Somit Neogi (*Alternate*)
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